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ABSTRACT

A whole-school intervention strategy to transform the teaching/learning culture of schools was designed and implemented at an NSF (National Science Foundation)-sponsored SSI (Statewide Systemic Initiative) program for educational reform in science and mathematics in its pilot and dissemination stages. The SSI simultaneously provides: effective curricula, alternative assessment, low-cost materials, pertinent professional development, alternate management styles, and supportive evaluation and monitoring. The strategy focuses on the school as a community and requires voluntary participation of all science and mathematics teachers as well as support and collaboration of the principal. Participant empowerment, participant motivation, paradigm shifts, and student achievement have been consistent across the pilot and dissemination stages emphasizing the usefulness of the strategy in meeting the program's goals. The strategy is a viable option for the long-term sustainability of educational reform efforts. (Author)

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Evaluating the Transformation of the Teaching/Learning Culture of Schools Involved in Systemic Science and Mathematics Educational Reform

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Running head: TRANSFORMATION OF TEACHING/LEARNING CULTURE

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Abstract

A whole-school intervention strategy to transform the teaching/learning culture of schools was designed and implemented at an NSF-sponsored SSI program for educational reform in Science and Mathematics in its pilot and dissemination stages. The SSI simultaneously provides: effective curricula, alternative assessment, low-cost materials, pertinent professional development, alternate management styles, and supportive evaluation and monitoring. The strategy focuses on the school as a community and requires voluntary participation of all Science and Mathematics teachers as well as support and collaboration of the principal. Participant empowerment, participant motivation, paradigm shifts, and student achievement have been consistent across the pilot and dissemination stages emphasizing the usefulness of the strategy in meeting the Program's goals. The strategy is a viable option for the long-term sustainability of educational reform efforts.

Evaluating the Transformation of the Teaching/Learning Culture of Schools Involved in Systemic Science and Mathematics Educational Reform

The National Science Foundation (NSF) is sponsoring twenty-five Statewide Systemic Initiative (SSI) Programs. These programs promote systemic change in education mainly by: (1) creating innovative curricula for the teaching of Science and Mathematics; (2) promoting equal access to educational opportunities in Science and Mathematics for students from diverse backgrounds; (3) establishing partnerships among key players at the local and state level; and (4) promoting the use of authentic assessment methods to measure student performance.

One major issue of systemic reform is how to ensure the long-term sustainability of the impact of the educational reform for tomorrow's society. This paper evaluates the strategy of one SSI to promote systemic change and to ensure the long-term sustainability of the educational reform by transforming the teaching/learning culture of schools using a whole-school intervention strategy. This strategy was carried out by the Program's staff in the pilot phase and is currently carried out through Regional Dissemination Centers located at former pilot schools where empowered teachers play a critical role.

Importance of the Study

The literature presents examples of educational reform programs which failed to meet their goals because they focused superficially on isolated components of the teaching/learning environment and did not address the school culture as a whole (e.g., Fullan & Miles, 1992). Therefore, mechanisms to simultaneously transform these components must be designed to: (1) generate systemic change; and (2) ensure the long-term sustainability of the impact of an educational reform.

An effective strategy was designed to transform the teaching/learning culture of schools as a means to promote systemic change in the pilot and dissemination stages of educational reform in Science and Mathematics in this SSI. The strategy is designed to foster the long-term sustainability of the changes promoted by the reform by empowering the schools and can be adapted for similar efforts in other subject areas. The study provides evidence supporting the strategy as a mechanism to support long-term change in the schools and highlights the applicability of an ecological empowerment theory (Rappaport, 1987).

Objectives

The objectives of this study are to: (1) describe the SSI's strategy to transform the teaching/learning culture of the schools in the pilot and dissemination stages; (2) present similarities and differences in implementation and outcomes of the strategy between the pilot and dissemination stages; (3) present the development and use of an instrument to measure these changes at the school level in the pilot and dissemination stages; and (4) discuss the impact of the whole-school intervention strategy on the long-term sustainability of the educational reform as this SSI extends its dissemination stage into a third generation of participating intermediate schools.

Perspective

The main goal of the studied SSI program is "Science and Mathematics for all students" thus expecting to provide high quality education in Science and Mathematics for students from diverse backgrounds. An innovative Science and Mathematics curriculum was designed to promote depth of understanding and higher-order thinking skills among intermediate school students based on the SS&C/NCTM/NRC philosophy (Puerto Rico Statewide Systemic Initiative Annual Progress Report, 1993-94, 1994a; OSR-9250052). In accordance with the latest literature on educational reform, the

curriculum facilitates the development of communities of learners within the schools (e.g., Loucks-Horsley, 1994; Shanker, 1990).

A participatory evaluation model was designed to assess the systemic impact of the PR-SSI. A combination of qualitative and quantitative data collection strategies is a key feature of this model where stakeholders and participants contribute to the overall process according to their areas of expertise thus fostering their sense of ownership of the evaluation experience (Dávila, 1996).

The implementation of the curriculum was closely monitored to collect baseline data to compare the performance of the pilot schools with the performance of the next generation of schools in the dissemination process. The results of the pilot testing of the reform in Science and Mathematics consistently showed high levels of achievement among students from all backgrounds as indicated by: (1) measurements of the affective, behavioral, and cognitive elements of attitudes based on an adaptation of the Motivated Learning Strategies Questionnaire (Pintrich, Smith, García, McKeachie, 1991); (2) scores in pre and post tests designed by the assessment staff; (3) scores in an adaptation of the NAEP test used for program calibration purposes. Preliminary results of the administration of the Student Empowerment Questionnaire also showed high levels of empowerment among students who are participating in the Program (Dávila, 1994). Another major finding in the evaluation of the Program in the intermediate pilot schools has been the high level of empowerment of the teachers who have been implementing the curriculum without any statistically significant differences between the scores in the Teacher Empowerment Questionnaire of samples of teachers from the pilot and second generation schools (Dávila & Gómez, 1994, 1995).

The results of the evaluation have shown clear evidence of the changes in the teaching/learning culture of the schools at the pilot phase and in the dissemination phase. It has been

evident that, as the students' achievement and sense of possession of the educational experience improved, the teachers' sense of ownership about the teaching-learning experience increased, and the school directors' management styles became participatory, the changes in the teaching/learning culture of the schools which had taken place at the pilot phase were also taking place at the dissemination phase (Dávila & Gómez, 1995).

The whole-school intervention strategy to transform the teaching/learning culture of the schools has promoted: (1) empowerment of teachers, students, and parents and other members of the school communities; (2) shifts in educational paradigms; (3) changes in attitudes among participants; and (4) improvements in student achievement. These individual indicators are elements of what the PR-SSI has described as school empowerment when looking at the changes occurring within the school as a unit. However, even though these changes were being consistently documented at different levels as part of the evaluation model's strong emphasis on triangulation, a single quantifiable and reliable indicator of these changes based on the literature on empowerment and culture change needed to be designed.

Theoretical Framework:

The design and implementation of the Puerto Rico Statewide Systemic Initiative's (PR-SSI) whole-school intervention strategy to transform the teaching/learning culture of the schools follows the latest trends on the literature on school change and empowerment. The strategy was planned in agreement with the tendencies on educational reform which focus on changing the system instead of the individual. The strategy offers a viable option to promote the long-term sustainability of systemic change as a result of educational reform efforts because it is centered on the school as a unit of change. (Puerto Rico Statewide Systemic Initiative, 1994b)

Sashkin and Egermeier (1992) reviewed the literature on school change from a historical standpoint and identified three broad perspectives. The rational-specific perspective was popular between the 1950's and the 1970's and was based on the premise that, if individuals receive information with empirical evidence of its success leading to improvements in the schools, they will apply that information to their own contexts. The political perspective was common during the early 1980's and proposed to mandate by law to change the system. The cultural perspective has been considered the perspective of the 1990's where the focus is on the actions of the leaders who are transforming their organizations based on principles borrowed from the business sector.

The three broad perspectives on school change identified by Sashkin and Egermeier (1992) serve as the basis for four operational strategies to implement change as they recommend to fix: (1) the parts, (2) the people, (3) the school, and (4) the system. The first strategy suggests the introduction of innovations of various types such as materials and practices with the support of extensive technical assistance. The second strategy proffers to improve the knowledge of the participants. The third strategy treats the school as an organization and looks at individuals working together to develop, implement, and evaluate solutions. The fourth strategy suggests using a multi-level school improvement approach to create change in the community which synthesizes practice knowledge about educational change through technical assistance and staff development based on standards. This last strategy recommends to: (1) descentralize authority down to its lowest appropriate level; (2) change accountability since authority is consistent with responsibility; (3) restructure curricula and change instruction; and (4) empower or professionalize teachers. The authors further state that:

> Restructuring involves changes in roles, rules, and relationships between and among students and teachers, teachers and administrators, and administrators at various levels from the school building to the district office to the state level, all with the aim of improving student outcomes (p.12).

Sashkin and Egermeier (1992) underline the importance of staff development as a part of the school change effort including a sense of collegiality, a shared purpose, and a belief in continuous improvement. They also accentuate the relevance of looking at the context of the school when implementing such efforts. Therefore, they seem to support the fourth strategy mentioned above.

Bleich (1995) presents three components of true educational reform efforts. First, schools do not need fancy equipment to implement an educational reform, but they do need advice on how to optimize their available resources and on school reorganization. Second, schools can use traditional and non-traditional testing systems since traditional testing gives them credibility in their communities while they develop support for their innovations. Third, schools must provide a structure within the school community that empowers teachers where there is cooperative leadership and an assessment of resources focusing on the main mission: educating all students.

Fullan and Miles (1992) believe that the different components of reform efforts must be implemented simultaneously and in close coordination for the success of the programs since participants must internalize the process of change before it occurs and must learn about its sustainability. They describe change as uncertain, resource-hungry, and systemic. They state that change is a guided journey that requires the managing of the culture of the system across role groups and that it should be implemented locally before transferring it to a large scale.

Kirby, Wimpelberg, and Keaster (1992) as well as Heller (1993) acknowledge the importance of the principal's role in school restructuring efforts. These researchers emphasize that

changes in the principal's role within an environment where new partnerships between school community members are being formed do not minimize its significance. They underscore the value of congruence between educational philosophy and practice in the implementation of these efforts. Kirby et al. recommend three components in school restructuring to ensure success: (1) careful selection of participants; (2) monitoring of progress; and (3) negotiation of expectations.

The work of the previously cited authors addresses issues of participant empowerment and affirms its salience in educational reform. This concept has been widely examined elsewhere in the literature, yet there is little agreement on its definition (e.g., Clark, 1992; Ferrara & Nepa, 1993; Little, 1982; Miles, Saxl, & Lieberman, 1988; Monson & Monson, 1993; Short & Rinehart, 1992; Raywid, 1993; Short & Rinehart, 1993). Autonomy, accountability, staff development, decision-making, self-assessment, and content mastery have been identified as components of the concept at the individual level which can be extrapolated into a collective level as we examine schools as units of change instead of individuals.The work of Lightfoot (1985) and Rappaport (1987) is particularly relevant when examining the concept of empowerment in the schools at a collective level.

Lightfoot (1985) presents three assumptions for empowerment that can serve as a basis for promoting it in schools. First, opportunities for empowerment must begin early. Second, the expression of empowerment needs to be felt at every level because "empowerment of each group enhances the opportunities for its recognition and expression in other groups" (p.10). Third, empowerment reflects a dynamic process, not a static final state and cannot exist in an authoritarian structure; its practice and expression demand a more fluid state and symmetrical relationships.

Rappaport (1987) suggests that empowerment is context-dependent and that individuals

should be studied within their contexts. Programs must promote actions which are congruent with the world view of the participants with an interest in the role of the people. Programs centered on empowerment should be antidotes to person-centered programs as individuals work together in environments where there is a close relationship between actual and perceived power.

Rappaport (1987) introduces the idea of an ecological theory of empowerment given his strong emphasis on the importance of the context and of the environment in the emergence of empowerment. The theory proposes the following eleven assumptions:

(1) Empowerment is a multi-level construct which assumes mutual influence across levels of analysis and that takes time to occur.

(2) Empowerment assumes a radiating impact of one level on another.

(3) The historical context influences the outcomes of the Program.

(4) The cultural context matters and programs must expect individuals to bring their cultural assumptions with them.

(5) Longitudinal research is desirable and necessary as it is important to see empowerment happening over time.

(6) Empowerment theory is a world-view theory where proponents admit their presumptions about their goals, values, attitudes, beliefs, and intentions: people involved are seen as collaborators, researchers become action researchers, the choice of language is important as to what it communicates to researchers and to the people under study.

(7) The conditions of participation in one setting will have an impact on the empowerment of the members.

(8) Organizations holding empowerment ideology are better at finding resources than those based on a helper-helpee philosophy.

(9) Locally developed solutions are more empowering than single solutions applied in a general way.

(10) Size of setting matters: settings must be small enough for meaningful roles for all members and large enough for resources.

(11) Empowerment is not a scarce resource, but rather once adopted as an ideology, empowerment tends to expand resources (pp. 139-42).

Rappaport's ecological theory of empowerment brings together the main features discussed in this literature review related to school change to transform a system considering its context. When participants internalize that promoting and maintaining change is their responsibility and begin to see the results of their contributions within a supportive environment, the long-term sustainability of educational reform becomes a reality.

The reviewed literature emphasizes the importance of the context and the culture where educational reform is taking place. However, it does not present a clear definition of either the context or the culture. Before proposing a strategy to transform that context or culture, we must define further what it is that we seek to transform.

Teaching/Learning Culture of the Schools

The sociological literature describes the attitudes, beliefs, values, expectations, knowledge, opportunities, and materials as the culture of the teaching/learning environment (e.g., Chinoy & Hewitt, 1975; Federico, 1975; Remmling & Campbell, 1970). The same literature refers to the process of socialization to a group's means to transmit its culture to its members (e.g., Craig,1996;

Gleitman, 1986; Kagan & Segal, 1988; Morris, 1988; Sroufe, Cooper, De Hart, & Marshall, 1996). Because the school is a major player in the socialization of the students in preparation for their participation in the greater society, educational reform efforts must focus their attention on the changes in the teaching/learning culture of the schools as they transmit scientific and mathematical knowledge.

Driver, Asoko, Leach, Mortimer, and Scott (1994) propose that scientific knowledge is socially constructed, validated, and communicated. They believe that scientific knowledge is a process of enculturation rather than an experience of discovery since learners have every day representations of Science but they are introduced to the cultural tools which they have available while they interpret and analyze the information. The authors suggest that there are no simple tools of pedagogy which could be used to transmit scientific knowledge, but that new ways of knowing such as dialogues with the teachers who have the responsibility to socialize learners into critical ways of knowing should be explored. The following statement illustrates their vision of the teacher as a mediator within the culture:

> Learning Science in the classroom involves children entering a new community of discourse, a new culture; the teacher is the often hard-pressed tour guide mediating between children's every day world and the world of Science (p.11).

Even though these researchers restrict their comments to Science, these general ideas can be applied to Mathematics because of the close interrelationship between both fields. Cobb (1994), who writes about Mathematics instruction, underscores the importance of looking at how children learn and what are the cultural practices in the learners' cultural milieu.

The various elements which compose the teaching/learning culture of a school can also be considered elements of empowerment at the school level. After presenting a definition of the

teaching/learning culture of the schools, the strategy designed and implemented by the Puerto Rico Statewide Systemic Initiative for its transformation can be described. This strategy is a means to promote empowerment at the school level to foster the long-term sustainability of the educational reform.

Description of the Whole-School Intervention Strategy

The Puerto Rico Statewide Systemic Initiative designed a whole-school intervention strategy to transform the teaching/learning culture of the schools participating in its program which is consistent with the previously discussed literature. The strategy: (1) follows a multi-prong approach (Sashkin & Egermeier, 1992; Fullan & Miles, 1992); (2) emphasizes professional development based on standards (Sashkin & Egermeier, 1992); (3) started at a small scale (Fullan & Miles, 1992); (4) uses available resources (Bleich, 1995); (5) seeks to change instruction (Sashkin & Egermeier, 1992); (6) relies on low-cost materials (Bleich, 1995); (7) provides alternative assessment (Bleich, 1995); (8) offers assistance in school restructuring (Bleich, 1995); (9) includes built-in mechanisms to monitor its progress (Kirby et al., 1992); and (10) promotes teacher empowerment (Sashkin & Egermeier, (1992).

The vision that led to the design of the whole-school intervention strategy is consistent with Rappaport's (1987) ecological theory of empowerment because:

(1) The PR-SSI envisions empowerment as occurring at various levels: students, teachers parents, and other members of the school communities.

(2) The PR-SSI expects the experience of empowerment to be the driving force propelling the institutionalization of the educational reform.

(3) The historical moment of the end of a century and the preparation for the next millenium is the right moment to encourage teachers, students, and schools to own their educational experience through programs such as the PR-SSI.

(4) The PR-SSI acknowledges individual differences in the implementation of the educational reform and encourages individuals to adapt the curricular and assessment materials to meet their particular needs.

(5) The Program does not expect true systemic change to occur overnight.

(6) The vision of collaboration illustrated by the concept of empowerment is explored and experienced at various levels within the Program particularly through professional development activities.

(7) The Program provides mechanisms at the school level to contribute to create the best possible conditions for the emergence of empowerment.

(8) The PR-SSI encourages members of the school communities to reach out into their neighborhoods to identify resources to meet the individual needs of the schools.

(9) The PR-SSI began its educational reform efforts at a small scale before planning on expanding its reach by starting with seven intermediate pilot schools. The Program still limits the number of schools served by each Regional Dissemination Center to maintain the quality of the reform in the process of expansion.

(10) The PR-SSI encourages locally developed solutions to the challenges met by the schools because it acknowledges the role of the context of the schools in any situation.

This SSI has followed a whole-school intervention approach to promote long-term sustainable systemic change since its pilot stage and throughout its dissemination stage. The school

directors and the totality of the Science and Mathematics teachers of the schools agreed to: (1) participate in intensive professional development activities; (2) facilitate the evaluation and monitoring of the Program in the schools; and (3) participate in the dissemination of the Program for future generations of schools.

Following a multi-prong approach, the Program simultaneously provided: (1) effective curricula; (2) alternative assessment strategies; (3) pertinent professional development; (4) alternative management styles; (5) low cost materials; and (6) supportive evaluation and monitoring. The Science and Mathematics curricula were based on the SS&C/NCTM/NRC approach guided by standards and with a constructivist philosophical foundation which is based on the work of Piaget and Vygotsky; they were developed by teams of university professors specialized in Science, Mathematics, education, and assessment; curriculum development specialists; and classroom teachers who pilot tested the activities before field testing them in the seven intermediate pilot schools. Alternative assessment strategies such as portfolios, open-ended questions, and performance tasks were introduced to establish a correspondence between the new way of teaching and learning and the monitoring of student progress. Professional development was a very high priority since teachers and school directors must be immersed in the educational reform's philosophy before they can implement it confidently; four weeks of professional development activities focused on the curricular and assessment content and strategies are followed by eight Saturday workshops during the school year. Advice on alternative management styles is provided through workshops and individual meetings to meet each school's particular needs to further support the changes promoted by the curricular reform. The Program relies on the use of low-cost materials to make the curriculum available to all schools regardless of their level of funding for materials. Supportive

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evaluation and monitoring is provided to facilitate the implementation of the educational reform since the literature stresses the importance of avoiding isolation in these efforts as individuals need to feel part of communities and belonging to extended networks of support where risk-taking is encouraged.

The implementation of the curricular revision at the intermediate level followed a sequential model beginning in the seventh grade. The curriculum was first implemented in seven pilot intermediate public schools whose students and teachers represent the population of the Program's site in terms of geographical location and socio-economic background; teacher training and technical assistance were provided entirely by the Program's staff during this phase. The curriculum is currently implemented in the seventh and eighth grades in fifty-nine second generation intermediate public schools distributed across the Program's site; these schools are also representative of the overall teacher and student population which comes mostly from low socio-economic backgrounds. However, teacher training and technical assistance are now the responsibility of empowered teachers who participated in the pilot phase and who are currently in charge of promoting the educational reform within their regions following an assisted-peer dissemination strategy.

Description of the PR-SSI's Assisted-Peer Dissemination Strategy

Empowered teachers from the intermediate public pilot schools lead the assisted-peer dissemination strategy implemented by the reform through Regional Dissemination Centers (RDC's) located at former intermediate pilot schools. Each RDC provides teacher training and technical assistance to approximately ten schools within each region thus becoming very familiar with the context of these schools following the whole-school intervention strategy described above. The three key features of this strategy are: (1) partnerships between central PR-SSI staff (mostly

university faculty members) and the pilot school teachers who serve as disseminators; (2) built-in external (i.e., SSI staff, Regional Dissemination Center Coordinators, external evaluators) and self-correcting (i.e., communities of learners within the schools) mechanisms to achieve consistent levels of quality through successive generations of the dissemination process; and (3) mechanisms of assessment.

The coordinators of the Regional Dissemination Centers were selected on the basis of their mastery of subject matter content and teaching strategies as well as their leadership and empowerment as evidenced by numerous visits to their classrooms by the curricular and assessment staffs and by their participation in professional development activities for other teachers in various capacities. By working directly with the staff of the SSI, these teachers received hands-on experience on leading professional development activities and on presenting the Program to teachers from other schools and to other school personnel. After they were selected, the coordinators participated in staff development activities related to: (1) vision and philosophy of the PR-SSI; (2) making effective presentations; (3) preparing workplans; (4) developing leadership skills; (5) developing team-building skills; (6) becoming change agents; (7) documenting progress; and (8) evaluating presentations (Dávila & Gómez, 1995).

The coordinators develop their workplans with the assistance of the PR-SSI staff. They are responsible for identifying schools within their regions which would be interested in applying for participation in the PR-SSI and for making the necessary school visits and presentations. They design and carry out the professional development activities for the schools within their regions with the assistance of other teachers from their schools who have vast experience with the curricula in collaboration with high school teachers and university faculty members who are considered subject

matter specialists. The coordinators visit all the teachers from the schools within their regions in their classrooms to: (1) provide feedback about the implementation of the curricula; (2) help them to reflect on their teaching practices thus promoting the emergence of empowerment among the teachers; and (3) identify particular needs which could be addressed through professional development activities. They facilitate the coordination of school visits for other SSI staff members and the logistics for evaluation and assessment activities. They serve as spokespeople for the SSI in their regions and for the schools within their regions in the SSI thus becoming a crucial link in the educational reform.

The assisted-peer dissemination strategy was first implemented in the seven intermediate pilot schools to take the educational reform into its second generation of schools. Now that the second generation of schools has reached its second year of participation in the PR-SSI, the RDC coordinators identified and recommendeded second generation schools within their regions which could serve as RDC's for the third generation of PR-SSI intermediate schools. The new RDC's coordinators are currently participating in professional development activities that will enable them to become the leaders of the educational reform's third generation of intermediate schools following the whole-school intervention strategy described above.

Research Questions

The following questions were designed to guide this investigation:

(1) What has been the impact of the whole-school intervention strategy in transforming the teaching/learning culture of the schools in the pilot and dissemination stages of this educational reform?

(2) How does the level of empowerment of the intermediate pilot schools (as measured by the School Empowerment Questionnaire) compare with the level of empowerment of the second generation schools which were selected to disseminate the educational reform into thethird generation of intermediate schools?

(3) What are the implications of the impact of the whole-school intervention strategy for the long-term sustainability of the educational reform in Science and Mathematics?

Method

The use of a combination of qualitative and quantitative data collection methods characterizes the evaluation design of this SSI. Observation, archival, and self-report measures are used for triangulation purposes.

Data Source

The Science and Mathematics intermediate level teachers, the directors from the pilot schools, samples of directors from the second generation schools, and samples of students from the pilot and second generation schools provided data for this study. The coordinators of the Regional Dissemination Centers located at the former pilot schools as well as the Program's central staff also provided data for this study. School and program records as well as previous studies and evaluation reports were examined to obtain archival measures. The data were collected during the first semester of the 1995-96 school year.

Classroom and School Observations

Two main issues in the evaluation of the strategy to transform the teaching/learning culture of the schools are the teachers': (1) mastery of content and (2) use of innovative teaching and assessment techniques. The teachers' mastery of content was evaluated by classroom visits conducted by the Program's staff using a sample of 22 incoming seventh and eighth grade Science and Mathematics teachers from second generation schools; they used the Classroom Observation Guidelines, (see Appendix A) an adaptation of the Classroom Observation Form (Winters, AERA, 1994), to evaluate the new teachers' use of innovative teaching and assessment techniques.

Archival Measures

The student academic performance indicators included in the study were: (1) grade

distributions in Science and Mathematics; and (2) scores in the Program's pre/post tests. Grade distribution data were obtained from 44 second generation schools. Program pre/post test data in Science were obtained for seventh grade from a sample of 26 second generation (N= 453) and four pilot schools (N=80). The test consists of multiple-choice questions designed to assess higher-order thinking skills ("smart bubbles"), open-ended questions, and performance tasks. This test is designed to assess the value-added by the curriculum. Previous studies conducted by the evaluation staff as well as evaluation reports were used to compare the progress of the intermediate pilot schools with the progress of the second generation intermediate schools.

Self-report Measures: Semi-structured and Unstructured Interviews

A sample of 186 second generation eighth grade teachers participated in group interviews to assess (1) the ongoing changes occurring in their schools; (2) their experiences with the professional development activities; (3) the changes in their teaching and assessment practices; (4) the differences in students' attitudes and academic performance after implementing the new Science and Mathematics curriculum; and (5) contributing factors to the long-term sustainability of the reform. Comparable interviews were conducted individually with eight school directors from second generation schools to address those issues as well as: (1) changes in their management styles; (2) changes in their vision of Science and Mathematics; and (3) expected long-term impact of the Program in their schools. Similar interviews had been previously conducted with teachers and school directors from the intermediate pilot schools for baseline purposes.

A sample of 56 seventh grade and 54 eighth grade students from second generation schools participated in group interviews which addressed: (1) level of interest in Science and Mathematics; (2) comparison between the traditional curricula and the PR-SSI's curricula; (3) relationship between

what they learn in Science and Mathematics and their daily lives; and (4) recommendations to improve the curricula or the Program. Similar interviews were conducted with students from the intermediate pilot schools for baseline purposes. See Appendix B for all interview protocols.

Unstructured individual interviews have been conducted with the Program's staff throughout the implementation of the Program to discuss the progress of the whole-school intervention strategy in the pilot and dissemination stages in achieving the Program's goals.

Self-report Measures: Questionnaires

The Teacher Empowerment Questionnaire (Dávila & Gómez, AERA 1994), an adaptation of Short and Rinehart's (1993) School Participant Empowerment Scale, has been administered to incoming seventh and eighth grade teachers to obtain a measure of their level of empowerment. The scores from the sub-scales of this measure (i.e., decision-making, professional development, status, self-efficacy, autonomy, and impact) have been compared with the results of the semi-structured interviews and with those of the classrooom observations for validation purposes.

The Teacher Empowerment Questionnaire served as the basis for the development of the School Empowerment Questionnaire because of its usefulness in quantifying the elusive concept of empowerment. The procedure followed by Short and Rinehart (1993) to develop the School Participant Empowerment Scale inspired the design of the Teacher Empowerment Questionnaire and of the School Empowerment Questionnaire.

The School Empowerment Questionnaire was designed to measure changes in the teaching/learning culture of the schools as well as the school communities' sense of ownership of the educational experiences. The questionnaire was developed based on the input of focus groups composed of teachers and school directors from participating schools who described and defined

the experience of school empowerment. Their input was translated into items that could be presented using a four-point Likert-type scale; the items were distributed among the Program's staff for content validation before pilot testing with a sample of participating and non-participating schools.

The final draft of the School Empowerment Questionnaire (see Appendix C) consists of 48 items such as "The school lends its facilities to the community for activities" and "The school promotes leadership development among its teachers" with a four-point scale ranging from Very Much Agree = 4 to Very Much Disagree = 1 for a maximum possible score of 192 (alpha coefficient = 0.92). It is designed to be completed by teachers, school directors, parents, and other members of the school communities. Ninety-nine participants representing the seven intermediate pilot schools and 99 participants representing five second generation intermediate schools identified as Regional Dissemination Centers for the third generation of schools completed the questionnaire. The results of the questionnaire were compared with those of the semi-structured interviews and of the school observations for additional validation purposes.

Results and Conclusions

What has been the impact of the whole-school intervention strategy in transforming the teaching/learning culture of the schools in the pilot and dissemination stages of this educational reform?

Classroom Observations:

The classroom observations conducted with teachers of second generation intermediate schools revealed overall successful implementation of the curriculum by the majority of the teachers with some minor difficulties. The experts, recognized leaders in their fields and well-versed in the NCTM and NRC standards, acknowledged that the teachers needed time to complete the necessary teaching paradigm shifts but that they were making adequate progress towards that goal. Working in cooperative learning groups was among the teaching strategies most frequently used by the sample of teachers who are seeing their roles as guides and facilitators. Many teachers were using open-ended questions, portfolios, and reflexive diaries as a means to monitor student progress and requested assistance in this area. The experts reported observing high levels of motivation among teachers and students as well as among school directors towards the new curriculum and towards the educational reform in general.

Distribution of Science and Mathematics Grades:

A shift in the grade distribution towards higher numbers of A's, B's, and C's (typically about 75%) and lower numbers of D's and F's is seen in this sample of second generation schools when comparing the grade distributions in Science and Mathematics prior to the implementation of the PR-SSI and after the implementation of the PR-SSI. This effect is not found in the grade distributions of other subject areas such as Spanish, English, and Social Studies.

Scores in the Program's Science Pre/Post Tests:

The open-ended questions and performance tasks of the Program's Science Pre/Post Tests are scored using rubrics which are typically of four levels. The distribution of scores among the sample of second generation schools included in this study for the seventh grade tends to shift towards the higher levels of the rubric in the post-test. This shift reflects the gains of the students in terms of conceptual understanding and skill acquisition which is comparable to the performance of students from the pilot schools who took the same test at the same time (see Figures 1 and 2)

Semi-structured Interviews:

The eighth grade teachers from the second generation schools acknowledge that the Program requires additional time and effort for its successful implementation; those teachers who also teach in the seventh grade have noticed an increase in their confidence in implementing the curriculum in their second year as a result of their experiences during the previous year. However, they are generally enthusiastic about their experience because they are beginning to see the results of their work in terms of student attitudes and student performance. Although the adaptation to working in cooperative learning groups was not easy for their students, the teachers consistently report that most of the students prefer learning under the curriculum of the PR-SSI. The teachers reported using cooperative learning groups in their classrooms and experimenting with open-ended questions, portfolios, and comic strips for student performance assessment. Some teachers also pointed out that the overall atmosphere of their schools is changing as the teachers learn to work collaboratively and help each other and the school principal becomes a leader and a facilitator.

The concerns of the interviewed teachers tend to center around practical issues related to class size and physical plant limitations and situations such as high enrollment and social problems

affecting their schools. They consistently request assistance with assessment activities because they are interested in monitoring the performance of their students as fairly as possible. They also request assistance with some of the curricular activities and with their adaptation. Many have expressed an interest in sharing a common class preparation period with other teachers to continue working collegially.

The teachers are expressing difficulties in completing the curricular units within the time guidelines and in meeting with other teachers when they lack a common class preparation period. They also request assistance with logistical aspects of the implementation of the curricular revision such as the delivery of materials.

The second generation school principals are favorably impressed with the impact of the PR-SSI in their schools and feel more comfortable with the Program in its second year of implementation because they have begun to see its results.. They have noticed the changes in attitudes and motivation among teachers and students and in their own perceptions of their roles within the schools. They have seen the progress in student academic performance as the distribution of A's, B's, and C's increases in Science and Mathematics. They also point out that their schools are generally obtaining equal or higher scores in standardized tests sponsored by the Department of Education than the non-participating schools within their regions, thus easing their initial concerns about the possible impact of the PR-SSI on student achievement.

The principals consistently request assistance in school restructuring since their teachers need common class preparation periods for the optimal implementation of the curricular reform. They would like to learn more about the PR-SSI's efforts in other areas of the educational reform so that they can provide this information to the parents of the students.

The seventh and eighth students from the second generation schools report higher levels of interest in Science and Mathematics than when they were learning under the traditional curricula. They enjoy learning using manipulatives and discovering the answers by themselves under the guidance of their teachers. They admit that getting used to working collaboratively with their peers was difficult at first, but they felt differently about the situation as the semester progressed. In the interviews, the students mentioned examples of application of Science and Mathematics to their daily lives and of how they saw the relationship between both subject areas for the first time. They consistently request that the PR-SSI include other subject matters in its curricular revision. Eighth grade students who participated in the Program in the seventh grade consistently indicated that they felt more comfortable with the new curriculum as a result of their experiences during the seventh grade.

The results of the data collected to assess the impact of the whole-school intervention strategy on the teaching/learning culture of the schools using classroom observations, archival data, and semi-structured interviews during the pilot phase of the implementation of the educational reform and during the first year of the dissemination phase were available from evaluation reports and previous studies (e.g., Dávila & Gómez, 1994; 1995) for comparison purposes because of the PR-SSI's interest in maintaining the quality of the educational reform across generations of schools. The data showed similar patterns of responses across the pilot phase, the first year of the dissemination phase, and the second year of the dissemination phase; the data collected from teachers, students, and school directors who have participated in the PR-SSI during the two years of its dissemination phase demonstrated the expected levels of comfort and adjustment with the

Program which were also found in the second year of the pilot phase. These results were confirmed by the Program's staff through unstructured interviews.

How does the level of empowerment of the intermediate pilot schools (as measured by the "School Empowerment Questionnaire") compare with the level of empowerment of the second generation schools which were selected to disseminate the educational reform into the third generation of intermediate schools?

Table 1 presents a comparison of the average scores of the intermediate pilot schools which serve as Regional Dissemination Centers and of the second generation schools which were selected to serve as Regional Dissemination Centers for the third generation of intermediate schools.

Table 1

Comparison of Average Scores on the School Empowerment Questionnaire by Type of Intermediate School

	Pilot Schools (N= 99)	2nd. Generation Schools (N=99)
Average Scores	134.93	143.27
Standard Deviation	26.17	33.32
Degrees of Freedom	196	
t-value	-1.96	
Critical t	1.96	
p-value	.052	

Note: *$p < 0.05$

The table clearly indicates no statistically significant differences in the levels of school empowerment among the second generation intermediate schools. These schools joined the PR-SSI as a result of the work of the experienced and empowered teachers who implement the whole-school intervention strategy in their regions through the Regional Dissemination Centers located at the former intermediate pilot schools and quickly embraced the changes promoted by the educational reform. These results validate the selection of these schools as Regional Dissemination Centers for the third generation of intermediate schools based on the overall changes in their teaching/learning

culture after two years of participation in the Program. The results further confirm the usefulness of the School Empowerment Questionnaire as a mechanism to capture the different components of the changes in the teaching/learning culture of the schools.

What are the implications of the impact of the whole-school intervention strategy for the long-term sustainability of the educational reform in Science and Mathematics?

The results of this study raise several interesting issues related to the success of the whole-school intervention strategy in promoting the educational reform in Science and Mathematics. These issues pertain to: the Program's vision of empowerment; the PR-SSI's design of the strategy; the identification of teacher-leaders; the selection of schools to lead the dissemination process; the pace of the dissemination phase; the number of schools impacted in each successive generation; and the monitoring of the progress of the educational reform as they relate to its long-term sustainability.

The success of the strategy in the pilot phase was expected because of the level of attention and resources dedicated to the intermediate pilot schools since the PR-SSI began to promote systemic change at a small level before attempting to reach a larger number of schools as recommended by Fullan and Miles (1992). The goal of reaching increasing numbers of schools while maintaining the quality of the reform represented a major challenge for the PR-SSI and its staff particularly with the literature's emphasis on programs that fail to meet their goals especially when they try to increase the scope of their impact.

The Program's vision of empowerment as context-dependent and as a multi-level construct (Rappaport, 1987) contributed significantly to set the climate for the educational reform as the participants became immersed in the Program's philosophy and practiced its principles through multiple opportunities for professional development. The PR-SSI's staff adopted empowerment as

a world view (Rappaport, 1987) and used every available opportunity to promote it with the various participants of the Program (Puerto Rico Statewide Systemic Initiative, 1994a) through the different activities it sponsors.

The vision of empowerment that leads this educational reform was critical for the design of the whole-school intervention strategy which is based on the literature addressing simultaneous implementation of interventions to ensure success in educational reform (e.g.,Sashkin & Egermeier, 1992). Empowerment is seen as a dynamic process as Lightfoot (1985) proposes which benefits program participants at all levels and which radiates into the school community as a whole contributing to generate changes in the system beyond the Science and Mathematics classrooms and transforming the teaching/learning culture of the schools since the pilot stage following an ecological theory of empowerment (Rappaport, 1987).

The PR-SSI's staff played a key role in the readiness of the first group teacher-leaders through careful monitoring and follow-up of their teaching and assessment practices. The PR-SSI provided various opportunities for the teacher-leaders to demonstrate their mastery of content and strategies before they became in charge of disseminating the educational reform to the second generation schools in their regions. These experiences contributed significantly to their development of empowerment which includes their sense of self-efficacy to reach beyond their own classrooms for the benefit of all students. The selection of the first teacher-leaders to disseminate the educational reform to the second generation schools was crucial for the success of the strategy in promoting the transformation of the teaching/learning culture of these schools in preparation for their own role as disseminators into the third generation of intermediate schools.

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The design of the assisted-peer dissemination strategy was realistic in considering the number of schools which could be served adequately by each Regional Dissemination Center. By limiting the number of schools to approximately ten per center, the coordinators can more easily provide to these schools the individual attention that they need particularly as the beginning of the process. The selection of the schools based on their commitment to change contributed to the success of the strategy because the participants were ready to internalize change as Rappaport (1987) suggests.

The monitoring of the implementation of the educational reform during its pilot stage served formative purposes in the evaluation of the Program and provided a strong baseline for comparison of the successive iterations of the process (Kirby et al., 1992). This process also served to develop monitoring skills among the teachers and other members of the school communities which will be useful for their own self-assessment.

The findings highlight the success of the whole-school intervention strategy in combination with the assisted-peer dissemination strategy in promoting systemic change among increasing numbers of schools in the pilot and dissemination stages. There have been changes in the attitudes, beliefs, values, expectations, knowledge, opportunities, and materials within the learning environment (see previous definition of culture) that lead to an enriched atmosphere which benefits all the members of the school communities across generations of schools. After the success of the strategy in the second generation of intermediate schools, the Program can confidently expect similar results among the third generation of schools which will be lead by the empowered teachers from the second generation schools leading to the long-term sustainability of the educational reform.

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Appendix A

Classroom Observation Guidelines

PR-SSI

Guía de Observaciones en las Visitas de Apoyo a los/las Maestros(as)
en el Salón de Clases

Protocolo de Observaciones

Introducción:

El propósito de esta Guía de Observaciones es facilitar y estandarizar el proceso de visitas al salón de clases para proveer asesoramiento a los maestros que están implantando el currículo del Programa PR-SSI. De esta manera, el equipo de evaluación del PR-SSI podrá documentar con mayor efectividad el progreso y los cambios en la forma de enseñar y avaluar de los maestros participantes.

La Guía está diseñada para describir y documentar los eventos y las interacciones que ocurren en el salón de clases cuyo desarrollo dependerá de múltiples factores. Se entiende que cada salón de clases presentará unas características particulares y que una lección podrá ser enfocada de múltiples maneras dentro de la flexibilidad que provee el currículo.

Se solicita a los/las observadores(as) que utilicen los siguientes criterios para dirigir sus discusiones con los/las maestros(as) en las escuelas que visiten. Ya que los/las maestros/as habrán recibido copias de los criterios con anterioridad a la visita, se espera que estos hayan realizado su propia autoevaluación y que aprovechen la visita para recibir asesoramiento. Al finalizar la reunión con el/la maestro(a) y salir de la escuela, el/la observador(a) redactará un informe narrativo en el cual no aparecerá referencia directa a los criterios que se incluyen y lo entregará al/la coordinador(a) de su iniciativa al día siguiente quien a su vez le entregará copia a la directora del equipo de evaluación del PR-SSI. En el informe se deberá incluir la siguiente información en una hoja aparte: (1) fecha de la visita; (2) escuela; (3) maestro(a); (5) disciplina o materia; (6) grado; (7) lección/actividad observada; (8) período de observación; (8) observador(a) para efectos de documentación.

Se solicita el insumo de los/las observadores(as) para revisiones futuras del instrumento. Muchas gracias por su acostumbrada cooperación.

Adaptada de: Classroom Observation Form (Winters, 1994, AERA Handout)

Descripción de los criterios:

I. Rol del/la estudiante:

Se refiere a las diferentes formas de participación en el proceso de enseñanza-aprendizaje de los/las estudiantes.

II. Participación de los/las estudiantes:

Se desea auscultar el nivel de participación de los/las estudiantes a través de la lección.

III. Incorporación y procesamiento de material

Describe cómo los estudiantes incorporan y procesan el material que se está presentando en clases.

IV. Rol del/la maestro(a):

Se refiere a las diferentes formas de llevar una clase que se pueden utilizar en una lección individualmente o en conjunto en el transcurso de la misma.

V. Estilo de retroalimentación del/la maestro(a):

Este criterio se refiere a la forma en que el/la maestro(a) reacciona a las respuestas y comentarios de los/las estudiantes.

VI. Estrategias y técnicas de enseñanza y avaluación:

Presenta una serie de estrategias y técnicas que se pueden utilizar en el salón de clases en estos procesos. La siguiente lista presenta algunas alternativas que puede utilizar el/la maestro(a). En caso de que se esté utilizando alguna estrategia ó técnica que no aparezca en la lista, favor de incluirlo en sus comentarios.

a. Utiliza
   1. manipulativos:.....
   2. proyector vertical:.....
   3. diapositivas:.....
   4. calculadora:.....
   5. otros audiovisuales
      (especifique): _____
      _____

b. Utiliza técnicas innovadoras de enseñanza
   1. aprendizaje cooperativo:.....

2. método de descubrimiento: .....
3. uso de laboratorios: .....
4. representación de roles: .....
5. simulación: .....
6. otros (especifique): _____
_____

c. Utiliza técnicas innovadoras de "assessment" o avaluación auténtica
1. tirillas cómicas: .....
2. portafolios: .....
3. preguntas abiertas: .....
4. diario reflexivo: .....
5. pruebas de ejecución: .....
6. otros (especifique): _____
_____

d. Utiliza ejemplos de la vida diaria (provea algunos):

VII. Utilización del conocimiento previo de los/las estudiantes en la lección/actividad:

Se espera auscultar si los/las maestros(as) incluyen en las clases tanto el conocimiento como las experiencias previas de los/las estudiantes.

VIII. Evidencia de integración:

Este criterio busca evidencia del nivel de integración que se está fomentando en los salones de clases dentro de las disciplinas (ej., Ciencias Terrestres y Física) y entre las disciplinas (ej., Ciencias y Matemáticas).

IX. Logro de objetivos de la lección/actividad:

Este criterio se refiere a si se cumplieron los objetivos de la lección/actividad. Favor de incluir comentarios sobre elementos que contribuyeron a cumplir/no cumplir los objetivos.

X. Areas de interés especial identificadas por el/la maestro(a):

Como parte del proceso de retroalimentación a los/las maestros(as) se espera que ellos(as) identifiquen aquellas áreas en las que les gustaría mejorar y aquellas que les gustaría reforzar mediante asistencia individual y mediante talleres específicos. Este espacio fue diseñado para que se documenten estas áreas según identificadas.

XI. Observaciones generales y comentarios sobre la implantación del currículo en la escuela:

Este espacio está diseñado para hacer anotaciones generales y comentarios en torno a la visita al salón de clases.

Hoja de Información de las Visitas de Apoyo al Salón de Clases

Fecha de la visita: _____

Escuela: _____

Maestro(a): _____

Disciplina o Materia: _____

Grado: _____

Lección/Actividad observada: _____

Período de Observación: _____

Observador(a): _____

Guía de Observaciones en las Visitas de Apoyo a los/las Maestros(as)
en el Salón de Clases

A continuación se presentan una serie de criterios que deben guiar su discusión con el/la maestro(a) a quien estaba visitando.

I. Rol del/la estudiante.

II. Participación de los/las estudiantes.

III. Incorporación y procesamiento de material.

IV. Rol del/la maestro(a).

V. Estilo de retroalimentación del/la maestro(a).

VI. Estrategias y técnicas de enseñanza y avaluación.

VII. Utilización del conocimiento previo de los/las estudiantes en la lección/actividad.

VIII. Evidencia de integración.

IX. Logro de objetivos de la lección/actividad.

X. Areas de interés especial identificadas por el/la maestro(a).

XI. Observaciones generales y comentarios.

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PR-SSI
K-9 Curriculum
Classroom Observation Guide

Observation Protocol

Introduction:

The purpose of this Classroom Observation Guide is to facilitate and standardize the classroom observation process designed to offer constructive feedback to the teachers who are implementing the PR-SSI's curriculum. In this way, the evaluation team of the PR-SSI will be able to document progress and changes in teaching and assessment among the Program's participating teachers more effectively.

The Guide is designed to describe and document the events and interactions occurring in the classroom which are known to be affected by multiple factors. It is understood that each classroom will be unique and that each lesson can be taught in many different ways within the flexibility provided by the curriculum.

The following criteria are presented to the observers as a guide to direct the discussions about their observations with the teachers. Teachers are expected to conduct their own self-assessment prior to the classroom visit to benefit more from an open exchange of ideas and feedback with the observer because they received the criteria before the visit. After the meeting with the teacher ends and the observer returns to his/her office, s/he will prepare a report in which the criteria will not be addressed directly in the text (e.g., without subheadings). The director of the evaluation component will receive this report which will contain the following information on a separate cover sheet for documentation purposes: (1) date of visit; (2) school; (3) teacher; (4) discipline or subject area; (5) grade; (6) lesson or activity observed; (7) duration of the observation; (8) observer. It is understood that the report and the cover sheet will be separated upon receipt for confidentiality reasons.

The observers' input in future revisions of this instrument will be greatly appreciated. Thank you very much for your cooperation.

Adapted form: Classroom Observation Form (Winters, 1994, AERA Handout)

Description of the Criteria

I. Role of the student

Refers to the different ways in which students can participate in the teaching-learning process.

II. Participation of the student

Addresses the level of participation of the students throughout the lesson.

III. Processing of content

Describes how the students process the content of the lesson.

IV. Role of the teacher

Refers to the different ways which can be used to carry out a lesson by the teacher.

V. Feedback style of the teacher

Refers to how the teacher responds and reacts to the students' answers and comments.

VI. Teaching and assessment strategies and techniques

This criterion presents a series of strategies and techniques which can be used in the classroom for teaching and assessment purposes; the following list presents some of the options available to the teacher. Please add any strategies or techniques being used yet not included in the list.

a. Use of:
   1. manipulatives
   2. overhead projector
   3. slides
   4. calculator
   5. other audiovisual aids (please specify)

b. Innovative teaching techniques
   1. cooperative learning
   2. discovery approach
   3. laboratories
   4. role play
   5. simulations
   6. other (please specify)

c. Innovative assessment or authentic assessment techniques
   1. comic strips
   2. portfolios
   3. open-ended questions
   4. reflexive diaries
   5. performance tests
   6. other (please specify)

d. Use of examples from daily life experiences

VII. Use of the students' prior knowledge in the lesson/activity.

Addresses the teachers' use of the students' prior knowledge and experiences within the lesson/activity to increase its relevance to their lives.

VIII. Evidence of integration

Seeks evidence of integration within the disciplines (e.g., Earth Sciences and Physics) and between the disciplines (e.g., Science and Mathematics).

IX. Accomplishment of the objectives of the lesson/activity

Refers to whether the objectives of the lesson/activity were met. Please include comments about factors which could have contributed to either meeting or not meeting the objectives.

X. Areas of special interest as identified by the teacher

As part of the feedback process for the teachers, it is expected that they will identify specific area s of their performance which they would like to improve as well as those areas which they would like to strengthen through workshops and trainings as well as individual assistance. Please refer to those areas as expressed by the teacher.

XI. General observations and comments

Please provide any general observations or comments related to the classroom visit.

Classroom Observation Guide

The following criteria should direct your discussion of your classroom observation with the teacher.

I. Role of the student

II. Participation of the student

III. Processing of content

IV. role of the teacher

V. Feedback style of the teacher

VI. Teaching and assessment strategies and techniques

VII. Use of the students' prior knowledge in the lesson/activity

VIII. Evidence of integration

IX. Accomplishment of the objectives of the lesson/activity

X. Areas of special interest as identified by the teacher

XI. General observations and comments

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Appendix B

Interview Protocols

Protocolo de Entrevistas de Directores

Preguntas guías entrevistas a directores elemental e intermedia

1. ¿Cómo usted se siente implantando el currículo de PR-SSI?
2. ¿Cómo ha sido su experiencia con la implantación del currículo?
3. Como director, ¿qué dificultades ha confrontado con la implantación de este currículo en su escuela?
4. ¿A qué áreas usted entiende le debemos prestar atención con relación al Proyecto?
5. ¿Qué cosas nuevas están pasando en la escuela que usted entiende son resultados de este proyecto?
6. ¿Cómo están respondiendo los papás ante el nuevo currículo?
7. ¿Cómo están respondiendo los estudiantes al nuevo currículo?
8. ¿Qué impacto usted cree que este Proyecto va a tener en su escuela a largo plazo?
9. Comentarios adicionales.

Pregunta adicional para intermedia:

1. ¿Cuál ha sido su experiencia con los Centros de Diseminación y sus coordinadores?

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GUIDE QUESTIONS FOR INTERVIEWS WITH INTERMEDIATE LEVEL SCHOOL DIRECTORS

1. How do you feel implementing the PR-SSI's curriculum?
2. How has been your experience implementing the curriculum?
3. As a school director, what difficulties have you faced implementing the curriculum in your school?
4. Which areas of the Program should be getting more attention?
5. What changes are taking place in your school as a result of the Program?
6. How are the parents responding to the Program?
7. How are the students responding to the new curriculum?
8. How has been your experience with the Regional Dissemination Center and its coordinator?
9. What do you think will be the long-term impact of the Program in your school?
10. Additional comments or suggestions.

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Protocolo de Entrevistas de Maestros

1. Describan los eventos acontecidos en la escuela desde la última visita de evaluación.

2. ¿Hasta dónde han llegado en los bloques? ¿Qué temas han trabajado? ¿Qué les falta por trabajar? ¿Cuál ha sido su reacción general a los bloques? ¿Qué actividades han modificado/adaptado/obviado? ¿Qué recomendaciones pueden hacer para mejorar los bloques?

3. ¿Cómo ha sido su experiencia con las actividades de adiestramiento? ¿Qué se puede hacer para mejorarlas?

4. ¿Cómo están respondiendo los estudiantes al nuevo currículo? (ej. actitudes, notas)

5. ¿Cómo están respondiendo los padres al nuevo currículo? (ej. actitudes, notas)

6. ¿Cómo ha sido su experiencia con los materiales que se utilizan en la implantación del nuevo currículo?

7. Otros comentarios.

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GUIDE QUESTIONS FOR FOLLOW-UP INTERVIEWS WITH INTERMEDIATE LEVEL TEACHERS

1. What changes have been taking place at the school level since the Program was implemented?

2. What difficulties are you facing with the implementation of the Program?

3. How are the students responding to the new curriculum? What changes have you noticed?

4. How has been your experience with the teacher enhancement activities? What changes have you made in your teaching and assessment practices since you began to participate in them?

5. How has been your experience with the curricular units or blocks? What changes or modifications have you made to improve them? What suggestions can you offer to improve or revise the blocks?

6. How has been your experience with the materials?

7. How are the parents responding to the Program? Have they approached you in any way?

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Entrevista a Estudiantes de Intermedia

1. Interés que generan las clases de Ciencia y Matemáticas.

   - ¿Qué cambios están observando en las clases de Ciencias y Matemáticas?

     Posibles contestaciones:

     - Tenemos bloques o usamos libros
     - Actividades de laboratorio
     - Actividades grupales
     - Utilización de materiales, entre otros

2. ¿Cómo conceptualizan las clases de Ciencia y Matemáticas al compararlas con años anteriores?

3. ¿Qué actividades realizan en sus clases de Ciencia y Matemáticas? Opinión que tienen sobre las mismas.

   - Indagar si en estas clases se hace uso de la estrategia de Trabajo Cooperativo.

     - ¿Les gusta trabajar en grupo o de forma individual? ¿Por qué?
     - ¿Cómo las actividades que se realizan en el salón de clases les ayuda a aprender?

       - Aprendizaje por descubrimiento
       - Concreto a abstracto

4. Opinión sobre el Trabajo Cooperativo.

5. Ejemplos de la aplicación de los currículos de Ciencias y Matemáticas a la vida diaria.

6. Ejemplos donde quede de manifiesto la integración entre los currículos de Ciencia y Matemáticas.

7. Opinión sobre materiales que utilizan. Considerar: cantidad, calidad, buen manejo.

8. Sugerencias.

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STUDENT INTERVIEW PROTOCOL

1. How interesting do you find the new way of teaching science and mathematics as opposed to the traditional way?

2. Have you noticed any changes in your way of learning and understanding science and mathematics?

3. What is your opinion about working in groups?

4. Which activities did you like best/least?

5. What do you think about the materials being used in the activities?

6. What are your recommendations for the improvement of the program?

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Appendix C

School Empowerment Questionnaire

Centro de Recursos para Ciencias e Ingeniería
PR-SSI

Cuestionario de Apotestamiento de Escuelas

Instrucciones generales: Favor de proveer la siguiente información antes de expresar su opinión con respecto a las áreas contenidas en este formato. Recuerde que es importante para la evaluación del Programa PR-SSI que usted, como participante del taller, conteste este cuestionario en su totalidad.

Escuela: _____

Puesto que ocupa: _____

Haga un círculo alrededor de la letra que mejor refleje su su sentir. No hay respuestas correctas ni incorrectas. Cada letra significa lo siguiente:

A = Muy de Acuerdo B = De Acuerdo C = En Desacuerdo D = Muy en Desacuerdo

En la hoja de contestaciones computadorizada que se les provee junto con este formulario, ennegrezca la letra que mejor exprese su opinión para cada uno de los reactivos. Sus respuestas deberán aparecer contenidas tanto en este formulario como en la hoja computadorizada la cual puede ser contestada utilizando un lápiz #2 o un bolígrafo según su preferencia. Recuerde sólo deberá aparecer una contestación para cada uno de los reactivos presentados.

Nuestra escuela:	Muy De Acuerdo	De Acuerdo	En Desacuerdo	Muy En Desacuerdo	N/A
1. Presta sus instalaciones para programas de tipo social para la comunidad que sirve.	A	B	C	D	E
2. Recomienda a los/as maestros(as) que se contratarán tomando en cuenta las sugerencias del personal de la escuela.	A	B	C	D	E
3. Provee tiempo en la organización escolar para que los estudiantes organicen y se reúnan como organizaciones estudiantiles.	A	B	C	D	E
4. Adiestra a su personal tomando en cuenta las necesidades del currículo que se vaya a implantar.	A	B	C	D	E

Favor de pasar a la próxima página.

Nuestra escuela:	Muy De Acuerdo	De Acuerdo	En Desacuerdo	Muy En Desacuerdo	N/A
5. Crea oportunidades para el desarrollo de liderazgo en sus estudiantes.	A	B	C	D	E
6. Presta sus instalaciones para orientaciones de tipo social para la comunidad que sirve.	A	B	C	D	E
7. Visualiza a los/las maestros(as) y administradores(as) como co-partícipes en la experiencia gerencial.	A	B	C	D	E
8. Crea oportunidades para el desarrollo de liderazgo en sus maestros(as).	A	B	C	D	E
9. Fomenta la participación de los/las estudiantes en la toma de aquellas decisiones que les afectan directamente a través de mecanismos tales como Consejos de Estudiantes.	A	B	C	D	E
10. Identifica posibles auspiciadores dentro de la comunidad que sirve.	A	B	C	D	E
11. Entiende que el rol del/la director/a es ser un/a facilitador/a.	A	B	C	D	E
12. Fomenta el adiestramiento y la capacitación profesional de los/las maestros(as) en distintas áreas.	A	B	C	D	E
13. Fomenta el que los estudiantes se sientan dueños de su educación.	A	B	C	D	E
14. Involucra a los padres en la escuela invitándoles a ser recursos en las actividades escolares.	A	B	C	D	E
15. Escoge el currículo que se va a implantar.	A	B	C	D	E
16. Provee un período de capacitación común para los/las maestros(as) de una disciplina.	A	B	C	D	E
17. Fomenta el desarrollo de la creatividad de los/las estudiantes.	A	B	C	D	E

Favor de pasar a la próxima página.

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Nuestra escuela:	Muy De Acuerdo	De Acuerdo	En Desacuerdo	Muy En Desacuerdo	N/A
18. Orienta a los padres sobre los ofrecimientos curriculares de la escuela.	A	B	C	D	E
19. Fomenta el cambio en la manera de pensar de los/las maestros(as) mediante el currículo que selecciona.	A	B	C	D	E
20. Busca programas y proyectos de beneficio para sus estudiantes.	A	B	C	D	E
21. Provee un período de capacitación común para los/las maestros(as) de un mismo grado.	A	B	C	D	E
22. Fomenta la comunicación y colaboración entre maestros(as) y administradores(as).	A	B	C	D	E
23. Entiende que los/las estudiantes son participantes activos en el proceso de enseñanza-aprendizaje.	A	B	C	D	E
24. Orienta a los padres sobre los ofrecimientos extracurriculares de la escuela.	A	B	C	D	E
25. Fomenta el cambio en la manera de pensar de los/las estudiantes mediante el currículo que selecciona.	A	B	C	D	E
26. Fomenta la participación de los/las maestros(as) en la toma de decisiones en la escuela.	A	B	C	D	E
27. Estimula a los/las estudiantes a que hagan preguntas y a que analicen lo que están aprendiendo en sus clases desde varios puntos de vista.	A	B	C	D	E
28. Solicita la cooperación de la comunidad para mejorar sus instalaciones.	A	B	C	D	E
29. Auspicia actividades que promueven la participación activa de los/las estudiantes en el proceso de enseñanza-aprendizaje después de horas de clase.	A	B	C	D	E

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Nuestra escuela:	Muy De Acuerdo	De Acuerdo	En Desacuerdo	Muy En Desacuerdo	N/A
30. Facilita que los/las maestros(as) incorporen nuevas estrategias y técnicas de enseñanza en el salón de clases.	A	B	C	D	E
31. Auspicia reuniones y talleres para los/las maestros(as) con el propósito de fomentar la integración del conocimiento entre las disciplinas (ej., Ciencias y Matemáticas).	A	B	C	D	E
32. Facilita que los/las estudiantes integren sus nuevos conocimientos con sus experiencias diarias.	A	B	C	D	E
33. Recibe la cooperación de la comunidad para mejorar sus instalaciones.	A	B	C	D	E
34. Fomenta un sentido de apropiación de la experiencia educativa entre los miembros de la comunidad escolar.	A	B	C	D	E
35. Facilita que los/las maestros(as) visiten otras escuelas para su mejoramiento profesional.	A	B	C	D	E
36. Estimula a los/las estudiantes a establecer conexiones entre los distintos campos del conocimiento.	A	B	C	D	E
37. Invita a los padres a colaborar en el proceso de mejorar los ofrecimientos de la escuela.	A	B	C	D	E
38. Utiliza nuevos modelos organizacionales para satisfacer sus necesidades administrativas.	A	B	C	D	E
39. Facilita que los/las maestros(as) se visiten mutuamente para su mejoramiento profesional.	A	B	C	D	E
40. Fomenta que el/la estudiante desarrolle al máximo sus capacidades y destrezas de pensamiento.	A	B	C	D	E

Favor de pasar a la próxima página.

Nuestra escuela:	Muy De Acuerdo	De Acuerdo	En Desacuerdo	Muy En Desacuerdo	N/A
41. Utiliza al máximo los recursos que le ofrece la comunidad para mejorar la experiencia educativa.	A	B	C	D	E
42. Busca formas alternas de organizar los períodos de clases para satisfacer mejor las necesidades de sus estudiantes y maestros(as).	A	B	C	D	E
43. Reconoce los logros de los/las estudiantes en competencias educativas (ej. Ferias Científicas, Olimpiadas Matemáticas).	A	B	C	D	E
44. Permite que los/las maestros(as) participen en reuniones y conferencias profesionales.	A	B	C	D	E
45. Ofrece actividades extracurriculares que complementan el aprendizaje del salón de clases.	A	B	C	D	E
46. Identifica las necesidades de posibles auspiciadores para satisfacerlas a través de cambios en sus ofrecimientos.	A	B	C	D	E
47. Estimula el desarrollo de la creatividad de los/las maestros(as) en el proceso de enseñanza.	A	B	C	D	E
48. Estimula a los/las estudiantes a participar en competencias educativas (ej., Ferias Científicas, Olimpiadas Matemáticas).	A	B	C	D	E

Muchas Gracias

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Translated Items from the School Empowerment Questionnaire

Our school:

1. Lends its facilities for community social programs.
2. Recommends possible teachers taking into consideration the suggestions from the school's staff.
3. Provides time within the school day for the students to organize and get together as student organizations.
4. Trains its staff taking into consideration the needs of the curriculum which will be implemented.
5. Creates opportunities for the development of leadership among its students.
6. Lends its facilities for community social program orientations.
7. Envisions teachers and administrators as co-participants in the management experience.
8. Creates opportunities for the development of leadership among its teachers
9. Fosters the participation of students in the decision-making process which directly affects them through mechanisms such as Student Councils.
10. Identifies possible sponsors in its own community.
11. Understands that the role of a school director is to be a facilitator.
12. Promotes the training and professional development of teachers in multiple areas.
13. Fosters a sense of ownership of the educational experience among its students.
14. Invites the parents to serve as resources in school activities to get them involved in what happens in the school.
15. Chooses which curriculum it will implement.
16. Provides a common/single free/preparation period for the teachers within a subject area.
17. Fosters the development of the students' creativity.

18. Offers orientations for parents about the curricular opportunities available.

19. Promotes changes in the teachers' ways of thinking through its curriculum.

20. Seeks programs and projects which will be beneficial for its students.

21. Provides a common/single free/preparation period for the teachers within a particular grade level.

22. Fosters communication and collaboration between teachers and administrators.

23. Understands that the students are active participants in the teaching-learning process.

24. Offers orientations for parents about the extracurricular opportunities available.

25. Promotes changes in the students' ways of thinking through its curriculum.

26. Fosters the teachers' participation in the school's decision-making process.

27. Motivates students to ask questions and to analyze what they have been learning in class from different points of view.

28. Requests the community's support to improve its facilities.

29. Sponsors activities which foster the students' active participation in the teaching-learning process after school hours.

30. Makes it easier (facilitates) for teachers to incorporate new teaching strategies and techniques in their classrooms.

31. Sponsors meetings and workshops for teachers to foster integration between disciplines (e.g., Science and Mathematics).

32. Makes it easier (facilitates) for students to integrate their new knowledge with their daily life experiences.

33. Receives the community's support to improve its facilities.

34. Fosters a sense of ownership of the educational experience among the school community.

35. Promotes that its teachers visit other schools for their professional development.

36. Motivates students to make connections between different knowledge domains.

37. Invites parents to collaborate in the improvement of what the school has to offer.

38. Uses new organizational models to meet its administrative needs.

39. Makes it easier (facilitates) that the teachers visit each other for their professional development.

40. Fosters that the students maximize the development of their cognitive capacities and thinking skills.

41. Maximizes its use of its community's resources to improve the educational experience.

42. Looks for alternate ways of organizing the school's schedule to meet the needs of its students and teachers.

43. Acknowledges the accomplishments of its students in educational competitions such as Science Fairs and Mathematics Olympics.

44. Allows teachers to participate in professional meetings and conferences.

45. Offers extracurricular activities to complement the teaching-learning process which takes place in the classroom.

46. Identifies the needs of possible community sponsors to meet them through its educational offerrings

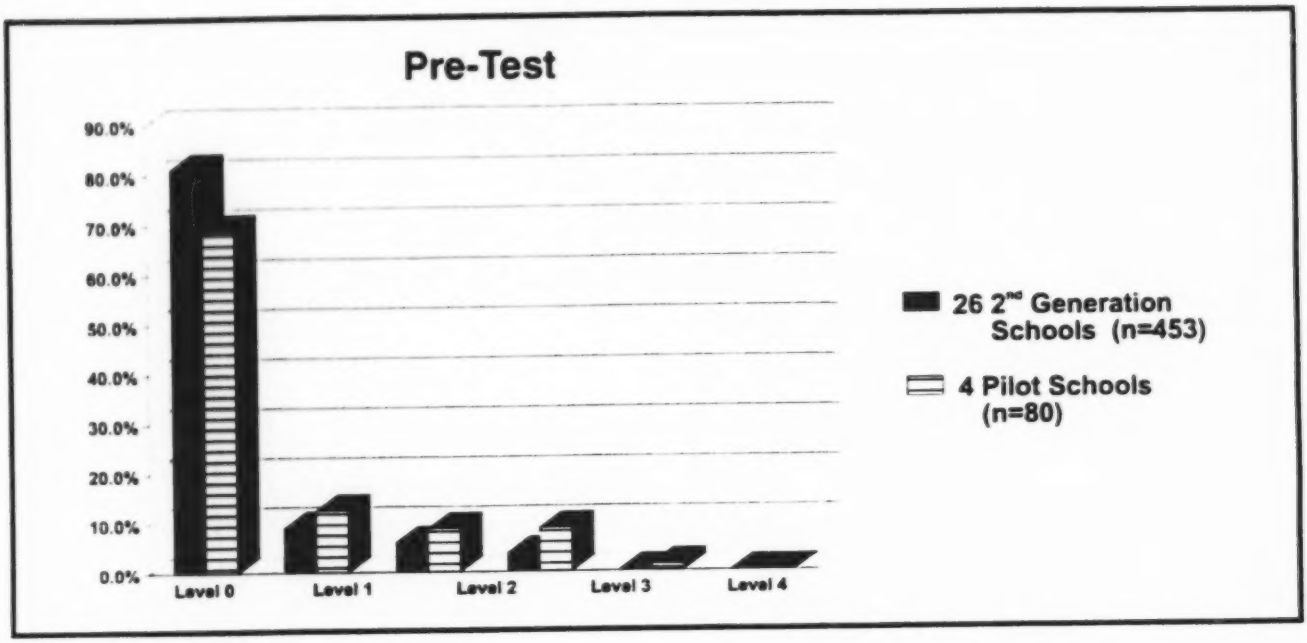
47. Fosters the development of the teachers' creativity.

48. Motivates students to participate in educational competitions such as Science Fairs and Mathematics Olympics.

Figure 1

PR-SSI
Second Generation Schools vs. Pilot Schools 1994-95 Science 7th grade

Performance Task
Physical Properties



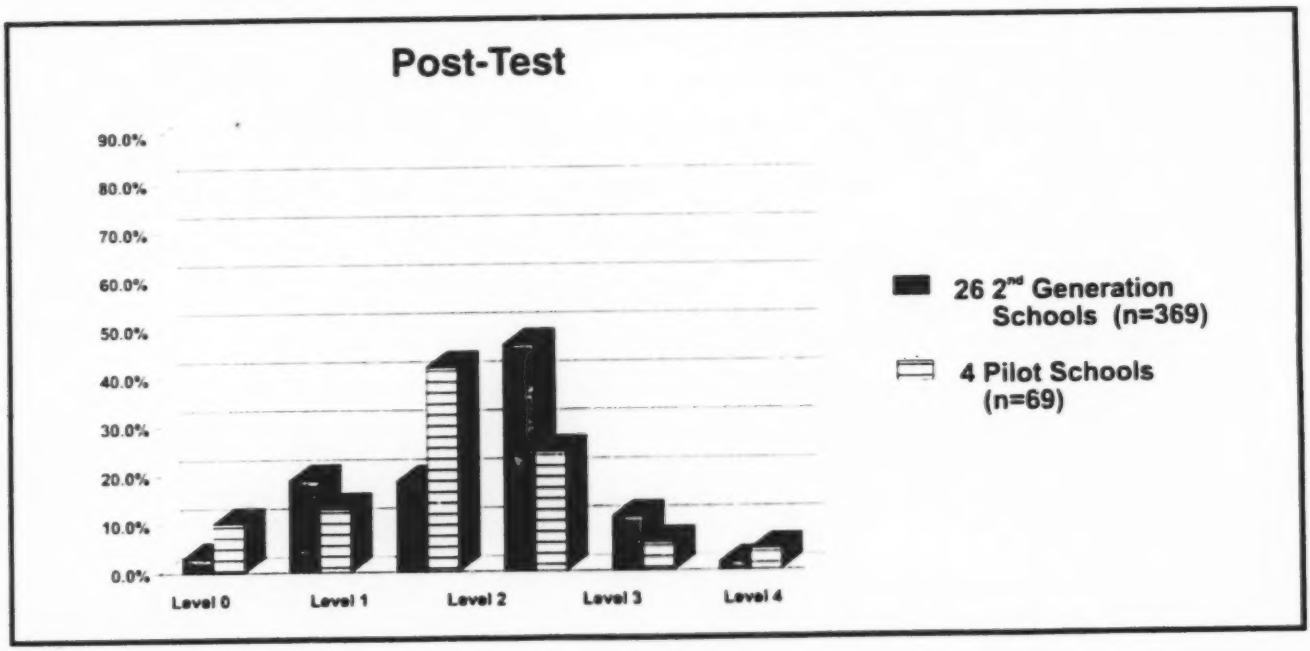


Figure 2

PR-SSI
Second Generation Schools vs. Pilot Schools 1994-95 Science 7th grade

Performance Task
Use of Scientific Instruments